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A REVIEW OF THE BUILDING MATERIALS INDUSTRY IN AFRICA AND THE POSSIBILITIES FOR A RAPID EXPANSION,

M65-438

TABLE OF CONTENTS

		Page
	Index of Graphs and Maps	- i -
	Explanatory Note	- iii -
CHAPTER I	Scope of the Report and Definitions	1
CHAPTER II	The Broad Outlines of the Problem	5
CHAPTER III	The Growing Demand for Building Materials	10
	(a) Past Trends	10
	(b) Future Prospects	13
CHAPTER IV	Problems and Possibilities for Development	19
	(a) The Factor of Raw-material Resources	19
	(b) The Scale of Operations Problems	21
	(c) Cost of Production and Prices	22
CHAPTER V	A Possible Pattern of Development- An Evaluation	25
ANNEX	Graph 1 : World Consumption of selected Building Materials - Volume Index trends	30
	Graph 2 : African Consumption of Selected Building Materials - Volume Index trends	30
	Graph 3 : African Per Capita Consumption of Selected Building Materials- Volume Index trends	30
	Graph 4 : Share of Africa of World Consumption of Selected Building Materials and Components : 1953 - 1963	31
	Graph 5 : Sub-regional Percentage Shares of Total African Consumption of Selected Building Materials and Components : 1953 - 1963	32

		Page
Graph 6	: African Production and Imports of Selected Building Materials and Components : Volume Index trends	33
Graph 7	: Relative Magnitudes of Apparent Consumption by Sub-regions and Structure of Supply	34
Map 1	: Presence of Domestic Production of Building Materials - 1960	36
Map 2	: Value of Imports of Construction Materials	37
Map 3	: Production of Cement - 1960	38
Map 4	: Production of Sawnwood - 1960	39
Map 5	: Production of Veneers and Plywood - 1960	40
Map 6	: Per capita Consumption of Cement in kg - 1960	41
Map 7	: Per capita Consumption of Sawnwood in m^3 - 1960	42
Map 8	: Per capita Consumption of Veneers and Plywood in m^3 - 1960	43
Map 9	: Per capita of Iron and Steel products - 1960	44

EXPLANATORY NOTE

1. In the following report, the Sub-regional grouping of the countries is as follows :-

North Africa: Algeria, Libya, Morocco, Sudan, Tunisia and the U.A.R.

West Africa : Dahomey, Gambia, Ghana, Guinea, Ivory Coast, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone, Togo and Upper Volta.

Central Africa: Angola, Cameroon, Central African Republic, Chad, Congo (Brazz.), Congo (Leo) and Gabon.

East Africa:: Burundi, Comoro, Ethiopia, French Somaliland, Kenya, Madagascar, Malawi, Mozambique, Reunion, Rhodesia, Seychelles, Somalia, Tanzania, Uganda and Zambia.

Southern Africa : Basutoland, Bechuanaland, South Africa, South West Africa and Swaziland.

2. The term "Africa excluding South Africa" in this report means the exclusion of all the countries of Southern Africa and not only South Africa.

CHAPTER I

SCOPE OF THE REPORT AND DEFINITIONS

1. In this report, the building materials and components industry is intended to include a wide range of specific industrial activities. It is assumed to embrace the activities of those manufacturing enterprises, which produce wholly or partially those materials which are incorporated permanently or temporarily in housing, building, civil engineering, and in general public work constructions including the production of materials for repair and maintenance. Excluded from this broad definition of the building materials and components industries are those activities which are undertaken prior to the incorporation of the materials in constructions, such as : transporting to site, shaping, cutting, bending, mixing at site to cast the materials to the desired or essential state of final utilisation, and soon. These activities form part of the construction industry proper[1/].

2. Building materials and components are processed from a wide variety of basic resources. For purposes of clarity and convenience, the finished and semi-finished materials and components are classified in this report following the classification of the preponderant natural resources from which they are derived. In this way it also would reflect the ISIC[1/] classifications pertaining to the manufacturing sector. Primarily, the major building materials and components would be adequately covered by the following five major groupings of the manufacturing industry, namely: (1) Stone Quarrying, Clay and Sand Pits, (2) Wood Manufactures; (3) Non-Metallic Mineral Manufacturers; (4) Metal Manufactures, and (5) Manufactures of Chemical Origins.

3. By the very broad concepts that these terms suggest, however, such a classification, without the essential qualifications, falls far short of the precise definitions desired. It might even lead to confusion in that firstly, the end-uses of the products of any of the manufacturing groups listed above

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1/ See: International Standard Industrial Classification of All Economic Activities, UN, New York Statistical Papers. Series M. No.4 Rev.1 1958 for the definitions of the Construction Industry.

do not wholly take place in the construction industry, and secondly the classification would tend to conceal the relative importance of specific materials and components and finally it would not make possible the grouping of those materials with the same end-uses (substitute materials) for purposes of comparisons.

4. With these points in mind, the classification of building materials and components adopted in this report is thought to present a workable compromise solution and follows the pattern indicated in Table 1 below.

Table 1.

Classification of Building Materials and Components

Broad grouping	SITC 1/ references	Major materials mainly according to relative importance within the group	Remarks
A. Stone quarrying	273	Sand and gravel, aggregates, stone	Clay mining for brick and other clay products manufactures included under B
B. Non-metallic mineral building materials	661 662 664	Cement, clay products (bricks, blocks, clay pipes, tiles, etc), asbestos-cement products, cement products including pipes, prefabricated units, etc., flat glass products.	
C. Wood-based building products	631 632 641.6	Sawnwood, plywood, board products, poles.	
D. Metal building materials and components	673 674 675 676 677 678 682 - 687 691	Iron & steel products (bars, rods, light & heavy sections, sheets and plates, tubes and pipes), non-ferrous metal products(aluminium sheets & window frames, tin sheets, lead & copper pipes etc); finished structural parts of all metals	Does not include heating, lighting and plumbing fixtures.

1/ Standard International Trade classification UN Statistical Papers, Series M, N° 10

E. Building fittings and fixtures	812	Heating fixtures, sanitary wares in all materials, fittings and fixtures in all metals, lighting fixtures and fittings.	Excluding electrical installation materials.
F. Electrical installation materials	723	Insulated wire & cable, electrical insulating equipment including conduits	
G. Miscellaneous materials	521.1 533.3 581	Paints and varnishes, mineral tar, plastic sheets and pipes	

5. The list is by no means exhaustive, but it nevertheless adequately represents the range of the major and significant building materials and components used in the construction industry as a whole. It would be unduly ambitious, however, to attempt to cover all the materials listed above in this report. The emphasis of the report is, therefore, directed to a few selected basic materials, whose immediate development in Africa would play a significant and essential role in the economic development of the continent.

6. Under the heading of "basic materials", priority is given to cement and the allied products, timber, and iron and steel building products. These materials have vital roles in all construction activities in general and in many instances are irreplaceable. Cement and steel as the essential ingredients for reinforced concrete have uses ranging from small dwellings and major building structures to dams, reservoirs, and bridges. The same is also true of timber, which is used as shuttering and scaffolding material for concrete casting, joinery material in housing and building (in its finished form), and also as a structural material in place of steel and concrete.

7. In addition to the aforementioned materials, the report also considers flat glass, paints and varnishes, and electrical installation materials, as basic materials. Although their importance from the point of view of savings

through import substitution is not considerable, yet the development of these industries in Africa is inevitable and desirable from the point of view of the advantages of their domestic availabilities, and their contributions to employment and the acquisition of technical know-how.

8. The report also makes reference to "secondary materials" and "new materials", but this is done in a superficial and admittedly inadequate manner. With regard to secondary materials, in which category, walling, drainage and sanitary materials of clay products, and joinery, roofing and sanitary materials of metals (notably steel and aluminium) are included, the report is aimed at identifying the important roles they play in the diversification of building material production, and the improvement of quality and efficiency and also in stressing their special relevance under given technical conditions or given availability of resources and profitable productions. The scope for the introduction of new materials such as plastics, pressed wood products, and by-products of chemical and other industries, is also briefly discussed with the purpose of attaining the same results as were mentioned for secondary materials.

9. A further limitation on the scope and coverage of the report is imposed by the inadequacies of industrial statistical data in Africa today. This limitation is not, however, experienced in the case of the basic materials (cement, timber and iron and steel products), in general. In the case of other building materials adequate statistical series are not by and large available -a situation which limits seriously the proper and satisfactory coverage of these materials in a report of this kind. A typical example of these are stone quarry and sand pits production data. Very few countries in Africa report such productions. In other instances, the practice of reporting import statistics by values only (e.g. building fittings and fixtures, electrical distribution materials etc.) makes the assessment of the demand for these materials a difficult task. The report, however, by-and-large avoids such issues and on the whole attempts to concentrate the analysis of the present situation on official and readily available statistical data.

CHAPTER II

THE BROAD OUTLINES OF THE PROBLEM

10. The building materials industry is an important first step towards industrialization. Yet its stage of development in Africa is far from satisfactory. In the early sixties, the short-fall in supply for the continent as a whole was made up by imports of the order of 50 - 60 per cent of the value of total consumption. This figure was moreover considerably higher for the greater number of sub-regions and the majority of individual countries. Observation of long-term trends further indicates that the situation has not improved appreciably from past years.

11. The smallness of the African market or the absence or inadequancy of the appropriate resources do not on the whole seem to have been the determinant factors for the present state of under-development of the industry. In pre-independence Africa, policy decisions in general favoured the export of raw material resources from Africa and the import of the finished products. Transport and communication networks were set up to facilitate such a trade flow. Consequently, while a relatively efficient system was put into operation between resources centres in Africa and the rest of the world, that which could have assisted the development of inter-African trade did not materialize to a satisfactory level. This in itself created a vicious circle, for it could not link the scatter of small markets which in combination could have formed large enough markets to justify the setting-up of local industries.

12. The little of development that took place was mainly in connection with those materials whose local production is inevitable. Primary bulk materials such as walling bricks, concrete blocks, sand, aggregates, do not evidently lend themselves to long-distance haulage and their production locations are essentially governed by their proximities to the locations of their respective resources. It would be noted (see Map 1) that the production of these materials is widespread in all the countries of Africa. However widespread the operations of these materials are, nevertheless the production processes in the majority of countries are still of rudimentary character. Inferior quality of materials, low productivity, seasonal productions from small artisanal or inefficient semi-mechanized units are

the predominating characteristics of these activities.

13. At a later period, and especially in the early fifties, the development of the building materials would appear to have taken a more hopeful and encouraging character in a number of countries, especially in the North and East African sub-regions, but to a lesser extent in the West and Central African sub-regions. Primary transformation processes of raw materials resources were started in several countries. Consequently the sawmilling industry was expanded and to a limited extent also the production of primary metals such as copper, crude steel, aluminium, tin, lead, etc. These developments appear to have influenced favourably the building materials industry, for this was followed by the setting-up of a number of finished building material products, such as plymills, steel re-rolling mills, metal joinery, metal sheet corrugating plants, nails and paints factories etc.

14. These achievements did not, however, change appreciably the overall continental supply structure, for they were limited to very few countries. The supply pattern of Africa today is summarized in Table 2 below. It would be noted that imports represent about 55 per cent of the total value of building materials consumed in the continent excluding South Africa. Further analysis would further demonstrate the considerable contrasts between sub-regions and between countries concerning their relative dependency on imports. The majority of countries in fact resort to as much as 60 - 70 per cent of their domestic requirements on imports.

TABLE 2

African supply pattern of building materials and components

(Excluding South Africa)

Value Estimates in 1963 in 1000 million US.$

Building materials	Domestic production consumed locally	Imports	Hence domestic consumption	Imports as % of domestic consumption
TOTALS	0.54	0.66	1.20	55
Cement	0.20	0.06	0.26	23
Asbestos-cement) Other concrete) products) Clay products) Flat glass	0.14	0.06	0.20	30
Timber products	0.14	0.13	0.27	48

TABLE 2

African supply pattern of building materials and components

(Excluding South Africa)

Value estimates in 1963 in 1000 million US.$
(continued)

Building materials	Domestic production consumed locally	Imports	Hence domestic consumption	Imports as % of domestic consumption
TOTALS	0.54	0.66	1.20	55
Iron & steel products	0.14	0.33	0.37	90
Building fittings & fixtures	-	0.05	0.05	100
Electrical installation mats:	-	0.03	0.03	100
Paints & varnishes	0.02	0.03	0.05	60

15. Still there have been some notable developments. For example the cement industry has made considerable headway in that less than 25 per cent of total requirements are imported today. The West African sub-region is in fact the only area where a serious lag in domestic production still persists. Several of the sub-regions are also more or less self-sufficient in their timber requirements. It is the considerable consumption level of the wood-deficit countries of the North African sub-region which has raised the average African share of imports of these products to nearly 50 per cent of total domestic consumption.

16. With regard to iron and steel products however, African countries depend almost entirely on imports. The exceptions to the supply pattern are South Africa, Rhodesia, and the UAR which operate iron and steel complexes, (and are self-sufficient); as well as a few countries which have established small but nevertheless significant steel re-rolling mills (notably Nigeria, Ghana, Algeria, Morocco, Tunisia, Ethiopia and Uganda). In Africa, excluding South Africa, iron and steel products account for nearly 30 per cent of building material requirements; yet nearly 90 per cent of domestic requirements are covered by imports.

17. There is considerable scope for import substitution. In 1963 when the

construction activities on the continent were not at their peak in the period 1953 - 1963, nearly 700 million US dollars were estimated to have been spent on the acquisition of building materials and components. (See Table 2). The significance of this order of magnitude is that it represents over 3 per cent of gross national product and nearly 10 per cent of aggregate national imports of Africa.

18. The current supply situation justifies immediate large-scale development of the building materials industry. Future estimates of needs further stress the urgency of finding effective solutions to contain a trend which would otherwise worsen. The desire for accelerated economic development and its realization would involve the countries of Africa in large-scale construction activities. New dwellings to cope with increases in population, improved housing to replace obsolescence and slum areas, are essential preoccupations for orderly social and economic progress. At the same time, African countries will be faced with the need to build up their economic infrastructure: transport and communication networks, electric power, water supply, sewerage etc., which would require extensive constructions, besides industrial and other non-residential buildings.

19. The available resources to satisfy total needs in the foreseeable future are meagre. But within the framework of economic growth as measured by GDP, the needs that could be satisfied could be estimated for purposes of assessing the development targets for the building materials industry. Table 3 below sets out as a working hypothesis of the possible growth of GDP up to 1980 at an annual rate of 5.5 per cent and a corresponding growth of the share of gross domestic fixed capital formation from one-eighth to one fifth of GDP. Other assumptions in the table are self-explanatory and are based on secretariat assessments of current situations and trends.

20. The table shows that the expenditure on building materials could be expected to grow from the 1963 estimate of 1.2 thousand million US dollars to 4.7 thousand million dollars in 1980 at an annual compounded rate of 8.5 per cent within the modest perspectives of the assumed growth rate of 5.5 per cent for the economy. The share of these expenditures of GDP is also expected to grow from the estimated value of 4.6 per cent in 1963 to 7.2 per cent in 1980.

TABLE 3

Estimated growth of expenditure on building materials, and components in the period 1965 - 1980 in Africa excluding South Africa

(In 1000 million US $ at 1960 prices)

ASSUMPTIONS	1965	1970	1975	1980
1. GDP increasing by 5.5% annually	29	38	50	65
2. GDFCF increasing from 1/8 to 1/5 of GDP in 1960 - 1980	4.2	6.2	9.1	13.0
3. Investment in total constructions constant at 60 per cent of GDFCF	2.5	3.7	5.5	7.8
4. Expenditure on building materials constant at 60% of total construction expenditures.	1.5	2.2	3.3	4.7
5. Expenditure on building materials expressed as percentage of GDP (in 1963 4.6%)	5.2	5.8	6.6	7.2
6. Percentage share of imports of total expenditure on building materials on the hypothesis that the capacity of the domestic industry is not increasing within the period	60	73	82	87

Source: Secretariat

21. These orders of magnitude demonstrate the important role that the development of the building materials industry would be expected to play in economic development. In particular, it would be appreciated that if the industry is not made to cope with the growing needs, the drain on foreign exchange would pose a serious problem. In the extreme hypothesis of progress in the industry not taking place within the period 1963 - 1980, the value of imports would rise from 700 million US dollars to 4 thousand million dollars, and the share of imports in total expenditure from 55 per cent to nearly 90 per cent.

22. This is mentioned for the purpose of demonstrating the broad dimensions of the problem. Within this dimension the development of the industry must aim at arresting in the first place the rising trend of the share of imports noted above and in the second, reversing the trend in order to bring down this share to the lowest possible level within the shortest time possible. And the indications are, that there are no serious limitations that could not be overcome for the realization of this goal.

CHAPTER III

THE GROWING DEMAND FOR BUILDING MATERIALS

(a) Past Trends

23. Consumption of the basic building materials in Africa did not increase as fast as world consumption in the period 1953 - 1963. This is evident from a comparison of Graphs 1, 2 & 3. The change in the share of African consumption in world consumption of these materials is demonstrated pictorially in Graph 4. Since 1958, the trend was a downward one and reflects the slackening pace of construction activities in several countries during the period 1958 - 1963. Graph 5 further stresses the structural change that took place over the period for the sub-regions.

24. As a whole, however, a notable growth in consumption has taken place in the period 1953 - 1963. Indeed the consumption of some materials increased dramatically as is evident from Graph 2: that of cement rose by 62 per cent, of crude steel by 60 per cent, of sawnwood by 57 per cent and of plywood by 127 per cent. Table 4 below summarizes the average compounded annual rates of growth for these materials by sub-regions.

TABLE 4

Compounded annual rates of growth of the consumption of the basic building materials in Africa in the period 1953-1963

(percentage)

Sub-region	Cement	Crude steel	Sawnwood	Plywood	Board products
North Africa	7	6	4	12	22
West Africa	8	9	14	16	13
Central Africa	-	-	1	-	-
East Africa	3	3	3	12	-
Southern Africa	5	5	5	15	-
Total Africa	6	5	5	8	3

Source: secretariat computation

25. With the exception of the Central African sub-region, significant rates

of growth were realized. The trends of the Central African sub-region were, however, dominated by those in Congo (Leo), where consumption fell subsequent to 1960.

26. Graph 5 shows trends in domestic production and import. For most of the basic materials both supply sources have increased somewhat steadily. In the case of cement, however, domestic production has by and large kept close to trends in consumption, and in contrast import trends have decreased visibly. The relative importance of domestic production and imports in total consumption are shown in Graph 7, for the two years chosen, i.e. 1953 and 1963. For most of the basic materials and the majority of sub-regions, the relative importance and quantity of imports have not decreased appreciably.

27. In terms of per capita consumption, the growth trend was modest, The per capita consumption levels of Africa continue to represent a small fraction of world per capita consumption levels. In the early sixties, the ratios of African per capita consumption levels to those of world per capita consumption were 1/3 for cement, 1/8 for crude steel, 1/9 for sawnwood and 1/10 for plywood. These orders of magnitude did not furthermore show improvements on the situation of the early fifties. Faced with a faster rate of population growth (2.2 per cent) compared to the rate of growth of world consumption (1.7 per cent) on the one hand, and significant fluctuations in total consumption especially since the late fifties, Africa's share of world per capita consumption has tended to decrease. Nevertheless, for the continent to have increased its per capita consumption levels by 31 per cent for cement and crude steel, by 33 per cent for sawnwood and by 100 per cent for plywood under the above mentioned adverse factors would underline the potentials of the African market for building materials (See Graph 3).

28. Table 5 below summarizes the past trends and current levels of per capita consumption by sub-regions. Two series of rates of growth are shown; one an average compounded rate for the whole period and the other the best rate of growth sustained over a period of not less than five years within the period 1953 - 1963.

TABLE 5

Per capita consumption levels of basic building materials in the early sixties and rates by sub-regions

	Average Per Capita Consumptions 1/					
	Cement	Crude Steel	Sawn-wood	Ply-wood	Board Products	Cement
North Africa	68	16	18	1.2	0.40	4.1(4.1)
West Africa	23	6	7	0.3	0.13	6.7(7.5)
Central Africa	19	5	10	0.4	0.02	-(1.1)
East Africa	17	6	6	0.3	0.10	0.6(7.5)
Southern Africa	146	135	42	0.6	2.37	4.2(3.6)
Africa	39	17	12	0.6	0.30	2.8(3.3)
World	11¢	116	110	5.6	2.3	5.6(6.1)

Source : Secretariat Computation

1/ Per capitas in following units : Cement (kg), Crude steel (kg), Sawnwood and plywood m3 1000 products (kg)

2/ In brackets are the best compounded annual rates of growth attained over a period of not less five years during 1953 - 1963.

TABLE 5

Per capita consumption levels of basic building materials in the early sixties and assessment of past growth rates by sub-regions

	Average Per Capita Consumptions 1/					Rates of Growth (Compounded) 2/				
	Cement	Crude Steel	Sawn-wood	Ply-wood	Board Products	Cement	Crude Steel	Sawnwood	Plywood	Boar produ
North Africa	68	16	18	1.2	0.40	4.1(4.1)	3.9(6.9)	1.2(5.6)	10.0(11.2)	14.8(2
West Africa	23	6	7	0.3	0.13	6.7(7.5)	7.2(8.0)	13.1(14.9)	11.6(18.9)	12.5(1
Central Africa	19	5	10	0.4	0.02	-(1.1)	-(-)	- (2.9)	- (7.2)	- (2
East Africa	17	6	6	0.3	0.10	0.6(7.5)	- (1.5)	- (5.9)	7.2(25.9)	- (7
Southern Africa	146	135	42	0.6	2.37	4.2(3.6)	2.2(4.1)	2.5(11.0)	11.6(14.9)	12.2(13
Africa	39	17	12	0.6	0.30	2.8(3.3)	2.7(5.7)	2.9(5.4)	7.2(17.7)	0.5(1
World	114	116	110	5.6	2.3	5.6(6.1)	3.2(3.9)	2.7(3.8)	7.2(7.2)	9.6(9

Source : Secretariat Computation

1/ Per capitas in following units : Cement (kg), Crude steel (kg), Sawnwood and plywood m3 1000 inhabitants, board products (kg)

2/ In brackets are the best compounded annual rates of growth attained over a period of not less than five years during 1953 - 1963.

29. The first striking point that emerges from the table is the considerable disparity between sub-regions in per capita consumption levels. While the North and Southern African sub-regions have attained levels of per capita consumption of 2 -- 5 times the averages for the continent, the remaining three sub-regions account for less than half of these averages. It would also appear, that when the overall trend is one of growth, then those areas with the lower levels of per capita consumption seem to show the highest rates of growth. This observation is especially noticeable in the case of the West African sub-region. By contrast, in the Southern African sub-region, where high per capita levels have been attained. the rates of growth were among the lowest for the continent. Finally, as far as the rates of growth of the materials themselves are concerned these show an interesting aspect, in that it appears that relatively higher rates of growth are indicated for those materials whose use in Africa was introduced or encouraged in recent years. Thus, the rates of growth of plywood and board products are considerably higher than those for cement and crude steel.

30. These observations of past trends would be useful in the elaboration of a methodology for assessing future trends and quantifying the future demand for building materials, which is the subject matter of the section which follows.

(b) Future Prospects.

31. The justification for the methodologies, which are used for assessing the future demand for the major building materials in this section are adequately explained in other documents[1/]. It would, however, be appropriate to indicate here the broad concepts and aims underlying the methods used.

32. The methodologies used are based, directly or indirectly, on assumed, planned or assessed growth rates of the economy as measured by G.D.P. The linking of future demand to the plan of economic development is an inevitable step in order to be able to take the implications of accelerated economic development into account.

1/ Notably: The Building Materials Industry in Africa, Present situation and Future Prospects ECA, A.A. 1963
African Timber Trends and Prospects ECA/FAO 1965
Iron and Steel in Africa ECA 1964, A.A.

33. It will be appreciated that quantifying future growth rates for the economy is a difficult proposition. Any hypothesis could provoke argument. At the same time the concepts of per capita GDP and per capita consumption on which projection methods are often based could be considered to lead to unreliable results. Censuses of population have not been undertaken in the majority of African countries, and therefore the credibility of per capita computation is bound to be susceptible to understandable doubt.

34. Although, such and similar objections pose limitations on the use of a methodology based on the above concepts, nevertheless these objections would not invalidate it. This is especially true within the context of this report, where the aim is to evaluate broad orders of magnitude of future demand arising out of a given growth rate of the economy. In other words, the projection exercise aims at demonstrating the broad magnitude of the supply problem that would face Africa when the present desire and hope of African countries for accelerated economic development begin to materialize.

35. At the same time, however, a practical note is injected into the assumptions, in that the growth rates of the economy assumed for the exercise are of modest orders of magnitude. In fact they could be considered as the minimum growth rates within the grasp and possibility of the countries of Africa. The rates of growth of per capita GDP assumed for the period ending 1980 are as follows: North Africa, 4.0 per cent; West Africa 3.5 per cent; Central Africa, 3.0 per cent; and East Africa, 3.0 per cent. These rates are on the whole below the minimum set by the UN Development Decade, and moreover several countries have set rates of growth higher than those above. Consequently, it is not beyond the bounds of possibility that the projections in this report would be exceeded by a significant margin.

36. Table 6 below summarizes the demand for basic building materials by sub-regions. (The table excludes the Southern Africa sub-region, which anyway already enjoys self-sufficiency in its domestic supply of building materials and would experience little difficulty in expanding present sources to keep up with demand). The various steps of computations are not indicated in the table. For a detailed explanation of the methods of forecasting used

reference should be made to the papers listed in the footnote below[1/]. At the same time it would be convenient to summarize briefly the major co-efficients used.

37. Firstly, for forecasting the demand for cement and timber, the concept of elasticity of demand was used; elasticity of per capita cement consumption with respect to per capita GDP were computed to fall in the range of 1.8 - 2.6 depending on the sub-region; for sawnwood of the order of 1 - 1.5, and for plywood and board products in the range of 2 - 2.5. In order to forecast the demand for iron and steel products the capital formation content of GDP was assumed to reach 20 per cent of GDP in 1980 for Africa, excluding South Africa. Again following the hypothesis of a growing share of capital formation of GDP, expenditure on constructions and in particular expenditure estimates for housing and building formed the basis for forecasting sheet glass consumption. With regard to other materials, past rates of consumption were assumed to take place in the future as well. In these cases, therefore, the implication of accelerated development has not been taken into account. This is not considered serious in that (a) they are secondary products based on the use of the above mentioned basic materials, (b) they are in general substitute materials in which instance, forecasting is anyway a delicate and near-impossible matter, and (c) the interest of this report in these cases is to indicate import substitution possibilities as in general today they constitute import items almost wholly.

1/ Notably the Building Materials Industry in Africa, Present Situation and Future Prospects, A.A. 1963
African Timber Trends and Prospects ECA/FAO 1965
Iron and Steel in Africa ECA 1964, A.A.

TABLE 6

Estimates of demand for selected building materials and components in Africa excluding South Africa in 1970

Materials		Units	North Africa	West Africa	Central Africa	East Africa	Total Africa
Basic Materials:							
Cement	million	ton	8.5	4.5	1.5	2.5	17
Sawnwood	-"-	m.cu.	2.2	1.0	0.5	0.8	4.5
Iron & steel products	-"-	ton	1.9	1.0	0.3	0.9	4.1
Sheet glass	thousand	ton	41	14	5	14	74
Secondary Materials & Others:							
Asbestos cement products	thousand	ton	170	80	45	70	365
Clay products 1/ (excluding ceramic sanitary wares)	-"-	ton	105	30	10	15	160
Paints & varnishes 1/	-"-	ton	20	25	10	10	65
Plywood	-"-	m.cu.	210	65	30	45	350
Board products	-"-	ton	55	35	5	20	115

Source : secretariat computation.

1/ Only shortfall in domestic supply estimated

38. Table 7 below shows the shortfall in supply that would result in 1970. The estimates are based on the full utilization of present day installed capacity only.

39. The magnitude of the supply problem that would face African countries, excluding South Africa, becomes evident from the table. All items required for building and construction are not included. Conspicuous among these are electrical installation materials, sanitary, lighting and heating fittings and fixtures, and materials and components in non-ferrous metals for the totality of which supply the continent today depends on imports. Moreover, the results of the tabulation would tend to be under-estimates, since the computation assumes the full utilization by deficit countries of surplus production elsewhere within a given sub-region - an aim, that may not in practice be attained for sometime yet. This is especially true of the surplus production of timber products in west and Central Africa, where over 80 per cent of the exports are today directed to countries outside Africa.

40. Therefore, the magnitude of the shortages in supply that would face Africa in 1970 is very likely to be exceeded by a more considerable margin than has been indicated in Table 7. What is striking is that even under such a toned down estimate, considerable expansion of the building materials industry would be required to keep pace with demand. The cement industry would need to be expanded by 80 per cent, the iron and steel products industry by 600 per cent, the sheet glass industry by 430 per cent and so on.

41. The market for building materials at least on the sub-regional level, does not evidently constitute a hinderance to development as was thought in the past. On the contrary, it poses a serious problem of shortage and inadequacy for which urgent solutions would have to be sought.

TABLE 7

Shortfall in supply in 1970 in Africa, excluding South Africa of selected building materials and components

Materials	Units	Total Africa	North Africa	West Africa	Central Africa	East Africa
Basic Materials:						
Cement	tons	7.4	3.3	3.5	0.2	0.4
Sawnwood	m.cu.	2.3	2.0	-	-	0.3
Iron and steel products 1/	tons	3.5	1.4	1.0	0.3	0.8
Sheet glass	thousand tons	60	27	14	5	14
Secondary Materials and Others						
Asbestos-Cement	thousand tons	140	50	50	20	20
Clay products (excluding ceramic sanitary ware)	thousand tons	160	105	30	10	15
Paints and varnishes	thousand tons	65	20	25	10	10
Plywood	thousand tons	230	190	5	-	35
Board products	thousand tons	115	45	35	5	20

1/ Expressed in crude steel equivalents.

CHAPTER IV

PROBLEMS AND POSSIBILITIES FOR DEVELOPMENT

(a) The factor of Raw Material Resources:

42. The continent of Africa is not lacking in the major raw-material resources which are essential for the operations of the building materials industry. In many instances Africa is a major producer of basic resources as is evident from table 8 below.

TABLE 8.

African production of basic resources related to the building materials industry - 1963

Resource	African Production			Sub-regional Distribution of total production in %				African
	Unit	Quantity	Share of world production (%)	North Africa	West Africa	Central Africa	East Africa	Southern Africa
Asbestos	'000T	347	15	-	-	-	37	63
Bauxite	-"-	2100	8	-	99	-	1	-
Copper ore	-"-	986	24	1	-	27	63	9
Iron ore	-"-	11020	5	21	49	-	4	26
Lead Ore	-"-	191	9	50	-	-	11	39
Roundwoods	'000 m.cu.	19218	2	8	32	19	17	24
Tin Ore	'000T	20	12	-	44	36	11	9
Zinc Ore	-"-	242	8	29	-	41	16	24

Source : Mainly UN Statistical Yearbook 1964.

43. The table demonstrates the relative importance and distribution of some major resources. In addition to those in the table, Africa has extensive resources of other minerals, notably limestone, clay, silicates, etc.

44. It is noted from the table, however, that there is an overall imbalance in the distribution of resources sub-regional and country-wise. In many cases, only a handful of countries account for the major share of a given

1/ Industrial woods only

resource. For exemple, the Congo (Leo) and Zambia account for over 90 per cent of African production of copper; Algeria, Liberia and Sierra Leone for 60 per cent of iron ore production and so on. Also some sub-regions lack adequate amounts of those resources which are basic to resource - oriented industries, such as limestone, roundwoods, clays, etc. For example, resources of roundwoods in North Africa are of negligible order and limestone deposits in West Africa are noticeably inadequate.

45. At the same time, the exploitation of resources in Africa is undertaken primarily to satisfy the export demand outside Africa. For many countries a single or a few basic commodities are the main or sole sources of foreign exchange earnings. In the early sixties, over 900 million US dollars were earned annually from the export of raw material resources or their primary transformation equivalents, while less than 800 million US dollars was the expenditure annually on the import of finished building material products.

46. The two figures are obviously not comparable, but the unfavourable aspect of such a trade arrangement, purely from the point of view of balance of payment could be demonstrated taking one product, say iron and steel. In 1960, Africa imported about 1.3 million tons of finished iron and steel products and exported about 6.5 million tons of iron ore, - the latter of which is calculated to be equivalent to 4 million tons of finished steel[1/]. Thus, while the continent exported the equivalent of 4 million tons of finished steel in ore form in excess of its domestic requirements, and earned just over 200 million US dollars, nevertheless, it spent nearly 320 million US dollars on imports of the finished product.

47. Although the observations with regard to the geographic imbalance of the distribution of basic raw material resources on the one hand and the export alignment of resources on the other tend to disfavour the development of the domestic industry, yet they also indicate the vast potentials of the continent for import substitution industries and for the expansion of inter-African trade for the benefit of all in the continent.

1/ Long term trends and problems of the European Steel Industry, UN, ECE-Geneva 1959.

(b) The Scale of Operations Problem

48. It has been seen that at the sub-regional level, the present demand, let alone future demand, would be adequate to justify modern production units.

49. But the production of building materials and components from centralized units is not always practicable. Several building materials productions need to be fabricated near centres of end-uses to avoid transportation problems, which could attain enormous proportions, especially in the case of bulky and heavy materials such as building materials. In addition in Africa, transport facilities are still at inadequate levels of development, and consequently transport costs are in general prohibitive. This poses serious limitations on the establishment of units to serve sub-regional requirements for a wide range of basic building material requirements.

50. The complex problem that is raised by the desire to benefit from the economies of large scale operations on one hand and the practical limitations imposed by high marketing costs require detailed analysis. A summary report such as is this one, would not be the right place for such an exercise. At best the report can only indicate the broad divisions between those industries of sub-regional and national interests respectively.

51. By-and-large the development of a wide range of building materials to serve national needs is a choice that would be favoured by governments. For countries, where prevailing prices are high - and this usually happens in hinterland countries - such a course could in general be justified, especially for bulky and heavy materials such as cement, clay and cement products, etc. But the problem here is that today, technologies of production have advanced so fast that those small units which would have served the needs of many countries in Africa are considered obsolete by capital equipment manufacturers. It is not that the industrialists of the advanced countries cannot fabricate small productive units, but that their research efforts in these areas are not intensive enough. Consequently, the efficiency and adaptability of small units today under African conditions of inputs, etc., is open to question.

52. While the purely national development of the production of building materials has to overcome a complex series of technico-economic problems, on the other hand, the development of the building material industry to serve several countries within a meaningful economic entity could count on unimpeded progress. This might even prove to be the only sensible course to follow under certain conditions. When viewed from the lack of basic resources factor of some countries, there is considerable scope for interchange of products; the wood surplus countries could supply the wood-deficit countries with a range of wood products; clinker could be exported to those countries which would be unable to set up their own cement plants because of lack or inadequacy of limestone resources, etc. With regard to the factor of market size, the minimum requirement to justify domestic production, the production unit for certain materials calls for integrated industries, e.g. iron and steel works, sheet glass and ceramic ware manufacture, etc. The need and desire to economise on scarce resources, (funds, man power, fuel, etc.) might justify specialization and the sharing out of industries within a framework of sub-regional co-operation.

(c) Cost of Production and Prices:

53. The most significant role that the factor of scale of operations plays, is of course, connected with the ultimate aim of attaining low production costs. In so far as operations in African countries are concerned, there are clearly too many adverse factors to attain levels of costs of production which would be comparative to those in the advanced countries, even when the scales of operations are equivalent.

54. The capital cost of setting up a production unit in Africa is much higher. The ratio could be as high as 1 : 3, and even more. This comes about because of several reasons: maritime transport; expensive port and handling charges; high rail and road freight rates; inflated insurance premiums and commission charges; high cost of feasibility studies; erection and construction costs, which have to take account of the high fees of short-term expatriate salaries and allowances; the requirement of ancillary works under the typical African condition, whereby new access roads, housing and community facilities, and even new electric power generating plants might be required, etc.

55. Then there is the prevailing situation of high prices of inputs whether imported or supplied locally: high electric power tariffs; still higher delivery prices of fuels, the need of employing expatriate staff with all the expensive items that this requires (high salaries, allowances, etc.); low productivity; the need for stocking large quantities of supplies and spare parts to avoid stoppages due to long and unreliable delivery periods, etc.

56. However imposing the extent of the problem might appear, nevertheless there is considerable scope to lower significantly the prevailing high levels of costs of production through a concerted attack on the cost-sensitive elements of operations. Standardization of productive units based on the appropriate definition of the size of the African market might induce machinery and equipment manufacturers to reduce their f.o.b. prices as well as their erection costs as this would guarantee a larger market for their goods. It would not be beyond the bounds of possibility at the same time, for Africa to initiate the fabrication of machinery and equipment on a limited scale. The production units for certain materials such as bricks, blocks, sawnwood, wood products, etc., have characteristics which would not make their domestic fabrication in Africa unrealistic.

57. Then there is a further scope for reducing costs of production through the right choice and design of production units. In many cases, units that were designed for maximum efficiency under the specific input conditions of the advanced countries are used in Africa without the essential modifications. Studies and research, to adapt production units to specific African operation conditions, would no doubt bring about substantial economies of operation.

58. These and similar measures will contribute substantially to the attainment of reasonable prices for goods produced in Africa. At the same time, it would be appreciated that in several instances even the high costs of production levels could not by themselves constitute sufficient grounds for African Governments to postpone the

realization of a building materials industry, which otherwise indicates considerable merits. Many countries in Africa experience very high prices for imported building materials. The price differential between the exporting countries and the majority of countries in Africa could be as high as one to four. Hinterland countries are particularly subjected to prohibitive prices.

59. African countries could by-and-large rely on a higher margin of profitability to develop their domestic industries, and compete effectively with imported materials. High as their costs of production might be, they have the potentials to reduce substantially on prevailing prices. This mainly comes about through the elimination of transport and related costs of the voluminous and heavy products such as are the major types of building materials.

CHAPTER V

A POSSIBLE PATTERN FOR DEVELOPMENT - AN EVALUATION

60. The increased demand for building materials and components in the years to come and the need to expand the present capacity of the building materials industry in the continent are beyond question. The order of magnitude of the present and future gap between demand and supply is such that even relatively important errors in the assumptions on which the estimates were based, would not affect the general picture.

61. It would not be within the scope and purpose of this report to attempt to define in precise terms the most desirable form of development, let alone put forward detailed recommendations on individual plants for each building material. But a general idea of a possible overall pattern of development would be appropriate in order to assess the implications of expansions on resources (especially financing) and to evaluate in broad terms the economic impact of the development of the industry.

62. Table 9 below constitutes a proposal of a possible pattern of development to cover the estimated shortfall by 1970 of a few key materials. The size and distribution of units has been done taking into account the major economic and technical factors discussed in earlier chapters. The table is not inclusive of the total building materials and components effort of the continent. Notable ommissions are for example steel re-rolling mills, finished metal building component industries, wood joinery works, paints and varnishes, electrical installation materials, building fittings and fixtures, etc.

63. Although of modest coverage, nevertheless, the table demonstrates the extent of the development requirements of the continent, within the next few years.

TABLE 9

Estimate of manufacturing units to balance the demand of selected building materials

South Africa

Material	Remarks	Sub-Regional Locations		
		North Africa	West Africa	Central Afri
Cement	Plant sizes No. of Units	100-400,000 t.p.a. 14	30-200,000 t.p.a. 38	40-100,000 t.p.a. 3
Iron & steel Integrated works	Plant sizes No. of Units	600-1,000,000 -"- 2	600-1,000,000-"- 1	400-600,000 -"- 1
Sawnwood	Plant sizes No. of Units	10,000 m.cu.p.a. 50	10-20,000 m.cu.p.a. 50	10-20,000 m.cu.p.
Plywood	Plant sizes No. of Units	10-20,000 -"- 8	10-20,000 -"- 3	5-10,000 -"- 2
Board products	Plant sizes No. of Units	5-10,000 t.p.a. 30	5-10,000 t.p.a. 30	5-10,000 t.p.a. 30
Sheet glass	Plant sizes No. of Units	10,000 t.p.a. 3	6-10,000 t.p.a. 2	7,000 t.p.a. 1
Asbestos cement	Plant sizes No. of Units	15-25,000 t.p.a. 2	5-10,000 t.p.a. 5	5-8,000 t.p.a. 3
Clay products	Plant sizes No. of Units	25-40,000 t.p.a. 4	5-10,000 t.p.a. 3	5,000 t.p.a. 2

Source: Secretariat

TABLE 9

Estimate of manufacturing units to balance the demand of selected building materials in 1970 in Africa, Excluding South Africa

Material	Remarks	Sub-Regional Locations				Total No. of Units
		North Africa	West Africa	Central Africa	East Africa	
Cement	Plant sizes	100-400,000 t.p.a.	30-200,000 t.p.a.	40-100,000 t.p.a.	60-200,000 t.p.a.	-
	No. of Units	14	38	3	5	60
Iron & steel Integrated works	Plant sizes	600-1,000,000 -"-	600-1,000,000-"-	400-600,000 -"-	200-600,000 -"-	-
	No. of Units	2	1	1	2	6
Sawnwood	Plant sizes	10,000 m.cu.p.a.	10-20,000 m.cu.p.a.	10-20,000 m.cu.p.a.	5-10,000 m.cu.p.a.	-
	No. of Units	50	50	50	40	190
Plywood	Plant sizes	10-20,000 -"-	10-20,000 -"-	5-10,000 -"-	5-10,000 -"-	-
	No. of Units	8	3	2	4	17
Board products	Plant sizes	5-10,000 t.p.a.	5-10,000 t.p.a.	5-10,000 t.p.a.	5000 t.p.a.	-
	No. of Units	30	30	30	20	110
Sheet glass	Plant sizes	10,000 t.p.a.	6-10,000 t.p.a.	7,000 t.p.a.	10,000 t.p.a.	-
	No. of Units	3	2	1	2	8
Asbestos cement	Plant sizes	15-25,000 t.p.a.	5-10,000 t.p.a.	5-8,000 t.p.a.	5-10,000 t.p.a.	-
	No. of Units	2	5	3	3	16
Clay products	Plant sizes	25-40,000 t.p.a.	5-10,000 t.p.a.	5,000 t.p.a.	5,000 t.p.a.	-
	No. of Units	4	3	2	2	16

Source: Secretariat

64. Table 10 below which summarises the costs involved with such a development pattern, further defines the extent of the problem. The total investment requirement comes to nearly 1640 million US dollars for those materials selected for the purpose of the exercise. In addition, further investments would be required to expand building materials such as concrete products, building fittings and fixtures, paints and varnishes, wood and metal joinery works etc. Therefore, the above estimate could be raised to 2000 million US dollars to represent the overall investment requirements by 1970.

TABLE 10

Estimate of development cost for selected building materials and components for Africa, excluding South Africa

(Value in million US dollars)

Sub-region	Cement	Other non-metallic mineral products 1/	Iron & steel works	Timber products	Totals
North Africa	148	6	310	47	503
West Africa	250	9	300	47	606
Central Africa	20	4	200	37	261
East Africa	25	6	220	16	267
Total Africa Excl. South Africa	435	19	1030	147	1637

Source : secretariat

65. An investment of this magnitude must be viewed against the perspectives of the economic benefits that it will accrue. Recalling the broad assumptions that were made concerning future trends in development, it was noted that if the present installed capacity of the industry remains unchanged over the period 1965-1970 and that the additional demand is met by imports, then the share of imports of total expenditure would grow from 60 per cent (1965) to nearly 75 per cent (1970) for Africa including South Africa. This is one hypothesis, which demonstrates the magnitude of the supply problem under the most unfavourable prospects of development.

1/ Includes clay products, asbestos cement products, and sheet glass only.

66. An alternative hypothesis assumes that the building materials industry will be developed along the lines set forth in the present report and that the gradual substitution of imports will bring about a relative reduction in building material prices which, coupled with a moderate increase in building productivity, could result in an overall reduction in building costs. Over a period of ten years, a reduction in costs of about 10 per cent is not considered over-optimistic, judging from the experience of a number of developing countries.

67. Table 11 below summarizes the two hypotheses, and demonstrates the possible economic benefits.

TABLE 11

Estimates of Gains resulting from an expansion of the building materials industry in Africa excluding South Africa In a period 1960 - 1970.

(Thousand million US dollars at 1960 prices)

Breakdown of Expenditure		1970	Total cumulated over the period
Hypothesis A - Continuation of the present situation			
Investment in total construction	1.6	3.6	26
Expenditure on building materials	0.9	2.2	16
- of which imported materials	0.5	1.8	11
Imported materials as a percentage of total materials expenditure	54	82	
Hypothesis B - Possible Development			
Investment in total construction with decreasing costs"	1.6	3.2	24
Expenditure on building materials	0.9	1.9	14
- of which imported materials	0.5	0.5	5
Imported materials as a percentage of total materials expenditure	54	26	

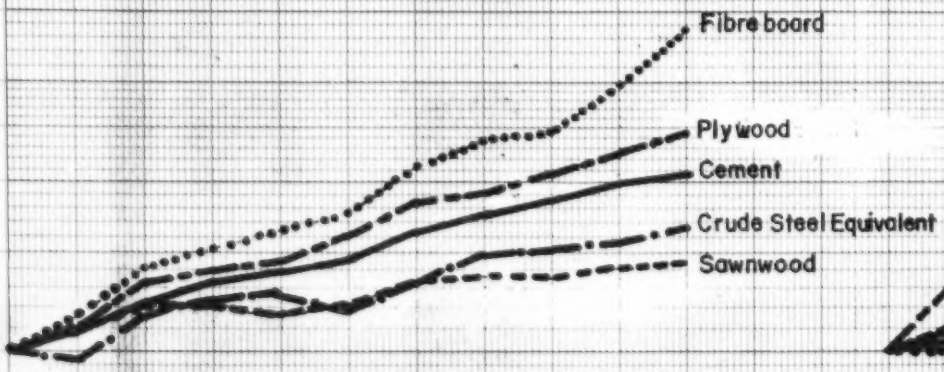
Source: Secretariat estimate

68. The last column of the table shows that the estimate of the investment arrived at of 2000 million US dollars would represent not more than one-eighth of the total expenditure on building materials cumulated over the period, and only two-fifthsof the savings in foreign currency which would be obtained if locally produced materials were substituted for imported ones.

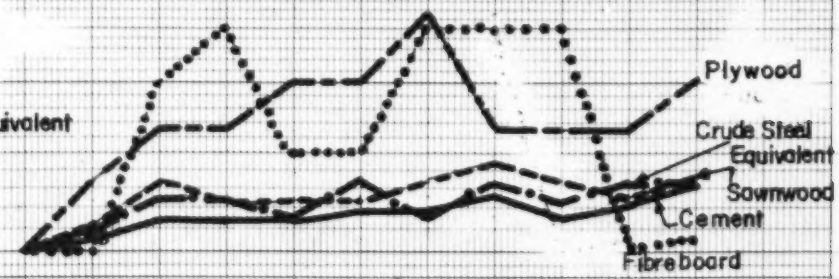
By the end of the period the annual expenditure on imported materials, if the present situation were allowed to continue (hypothesis A), would be of the same order of magnitude as the total investment required to make Africa practically self-sufficient.

69. These figures speak for themselves. The development of the building materials industry is not only necessary, but also possible within the framework of the economic development of the continent.

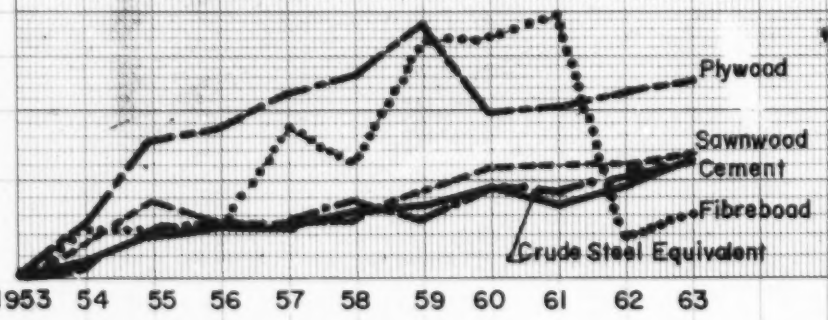
Graph 1— World Consumption of Selected Building Materials-Volume Index Trends



Graph 3— African Per Capita Consumption of Selected Building Materials—Volume Index Trends

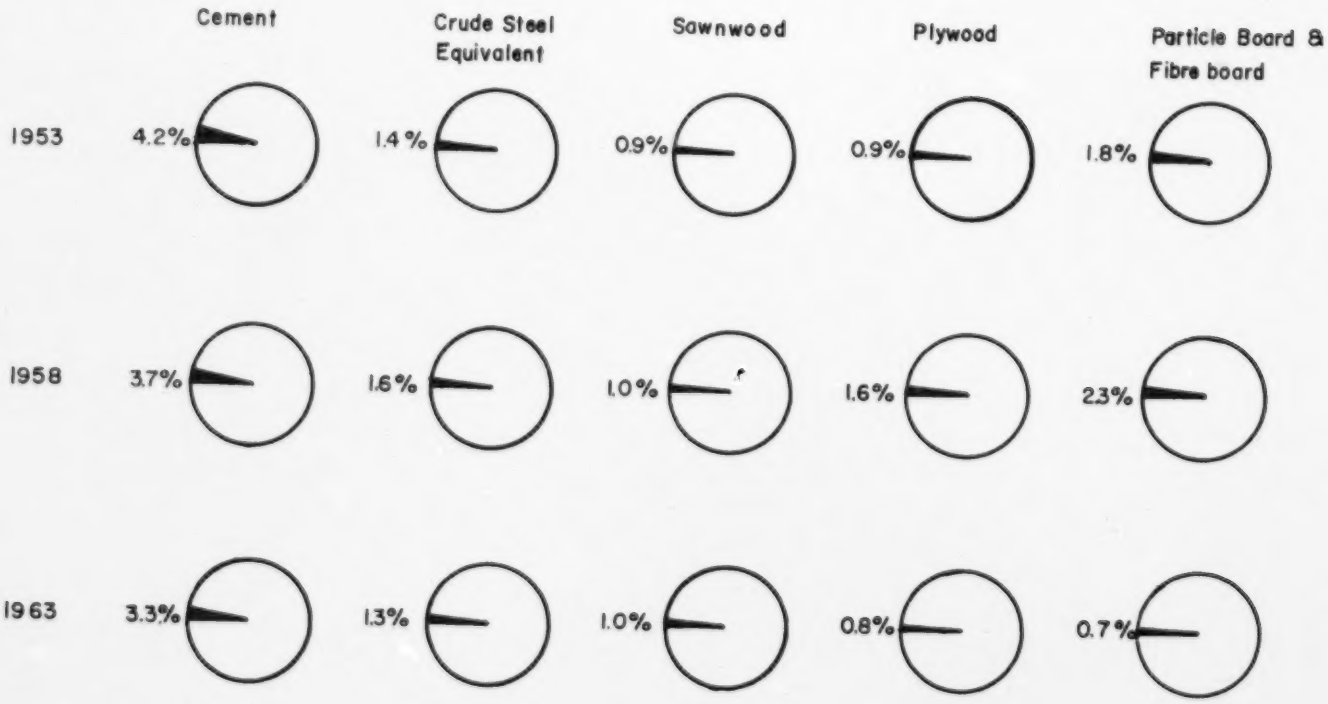


Graph 2— African Consumption of Selected Building Materials-Volume Index Trends



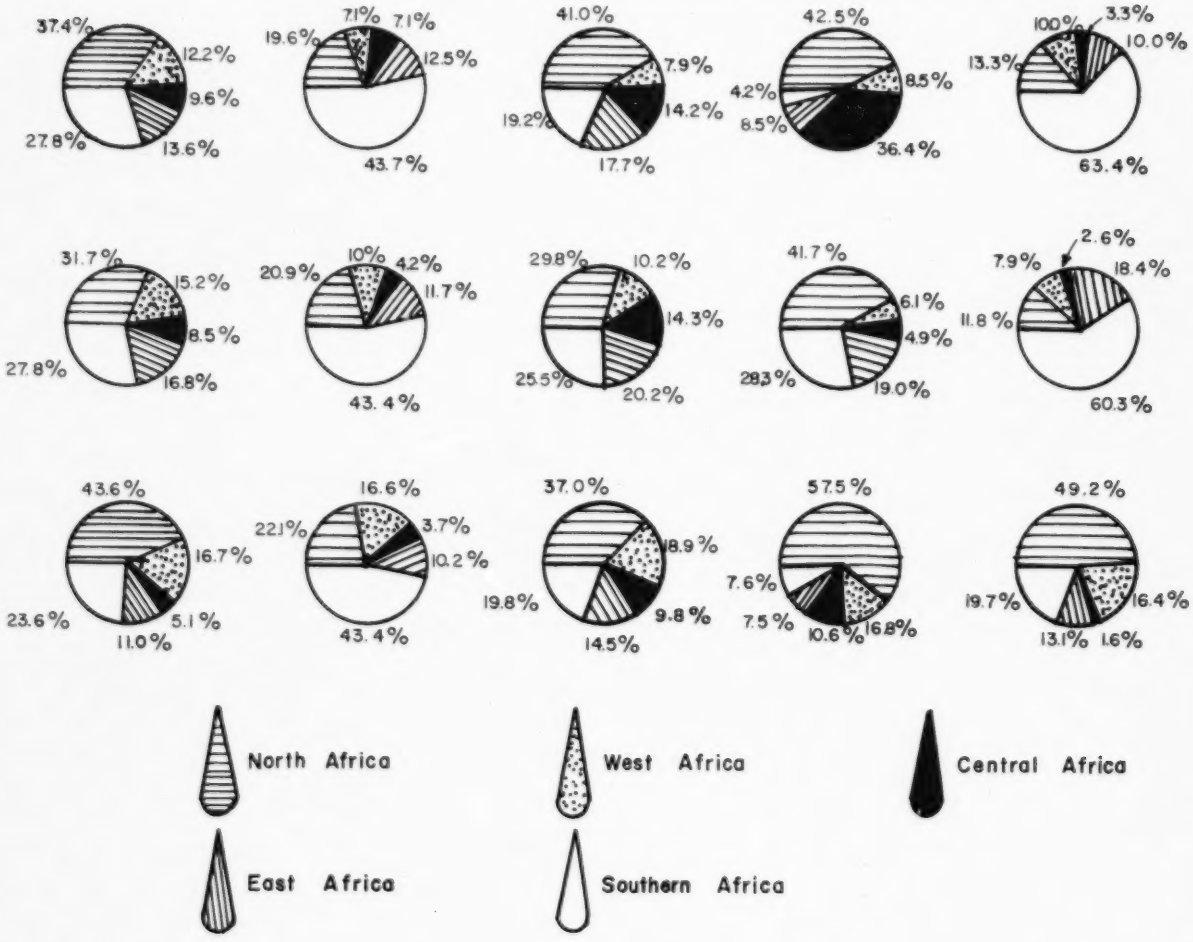
Graph 4

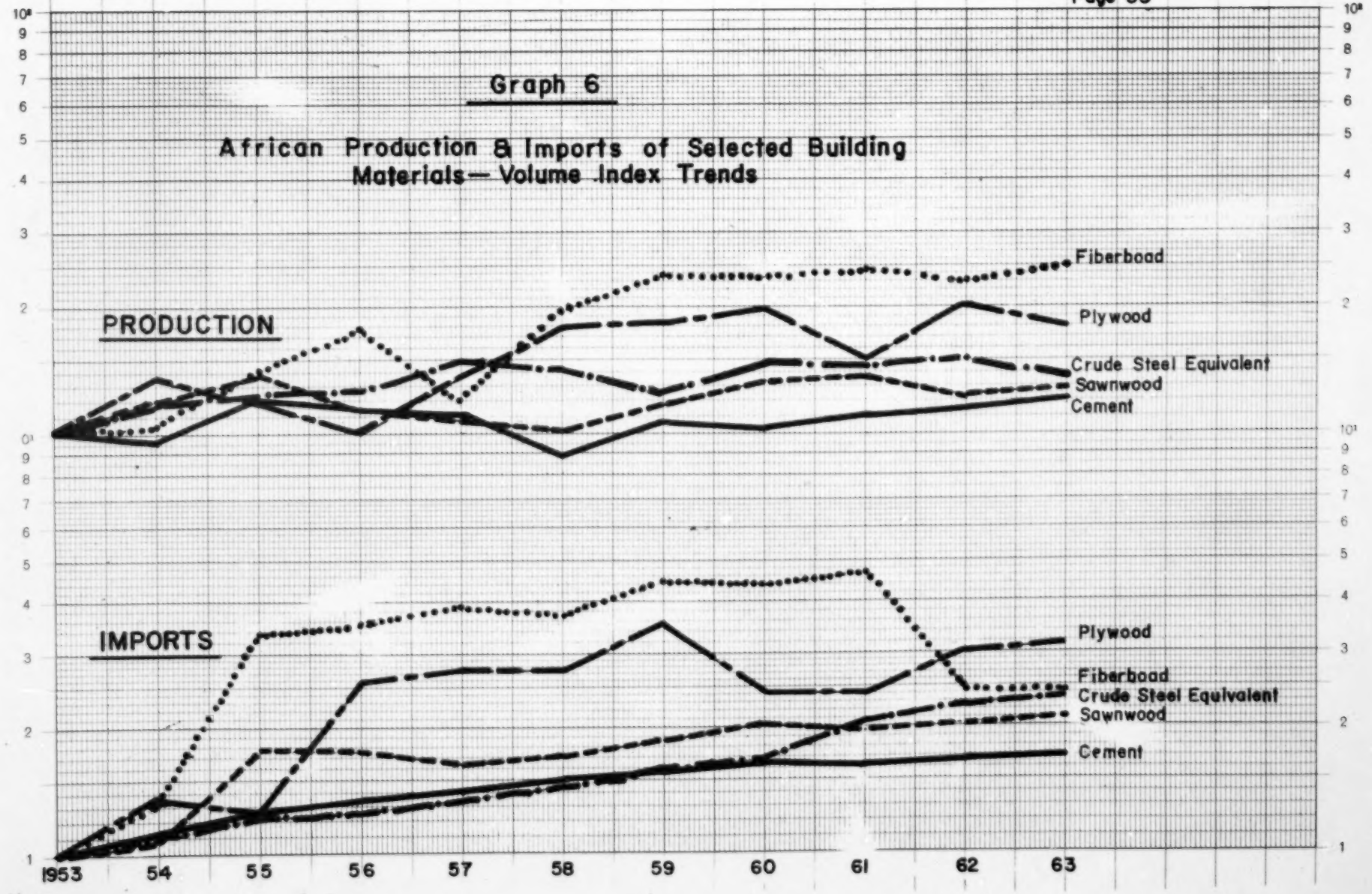
Share of Africa of World Consumption of Selected Building Materials & Component 1953—1963



Graph 5

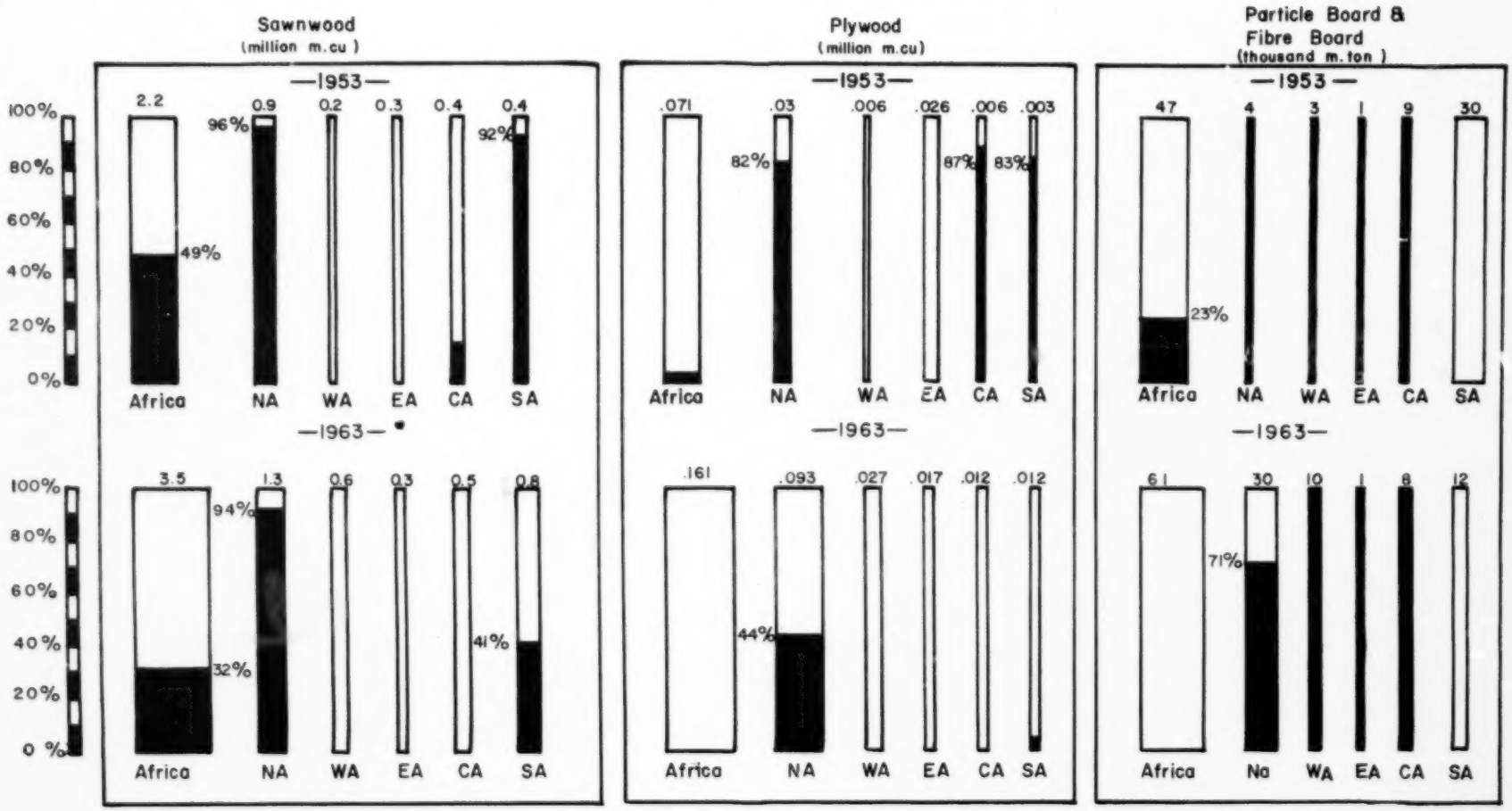
Sub-regional Percentage Shares of Total African Consumption of Selected Building Materials & Components 1953-1963




Graph 6
African Production & Imports of Selected Building Materials— Volume Index Trends
PRODUCTION
Fiberboad
Plywood
Crude Steel Equivalent
Sawnwood
Cement
IMPORTS
Plywood
Fiberboad
Crude Steel Equivalent
Sawnwood
Cement
1953
54
55
56
57
58
59
60
61
62
63

Graph 7

Relative Magnitudes of Apparent Consumption by Sub-regions & Structure of Supply

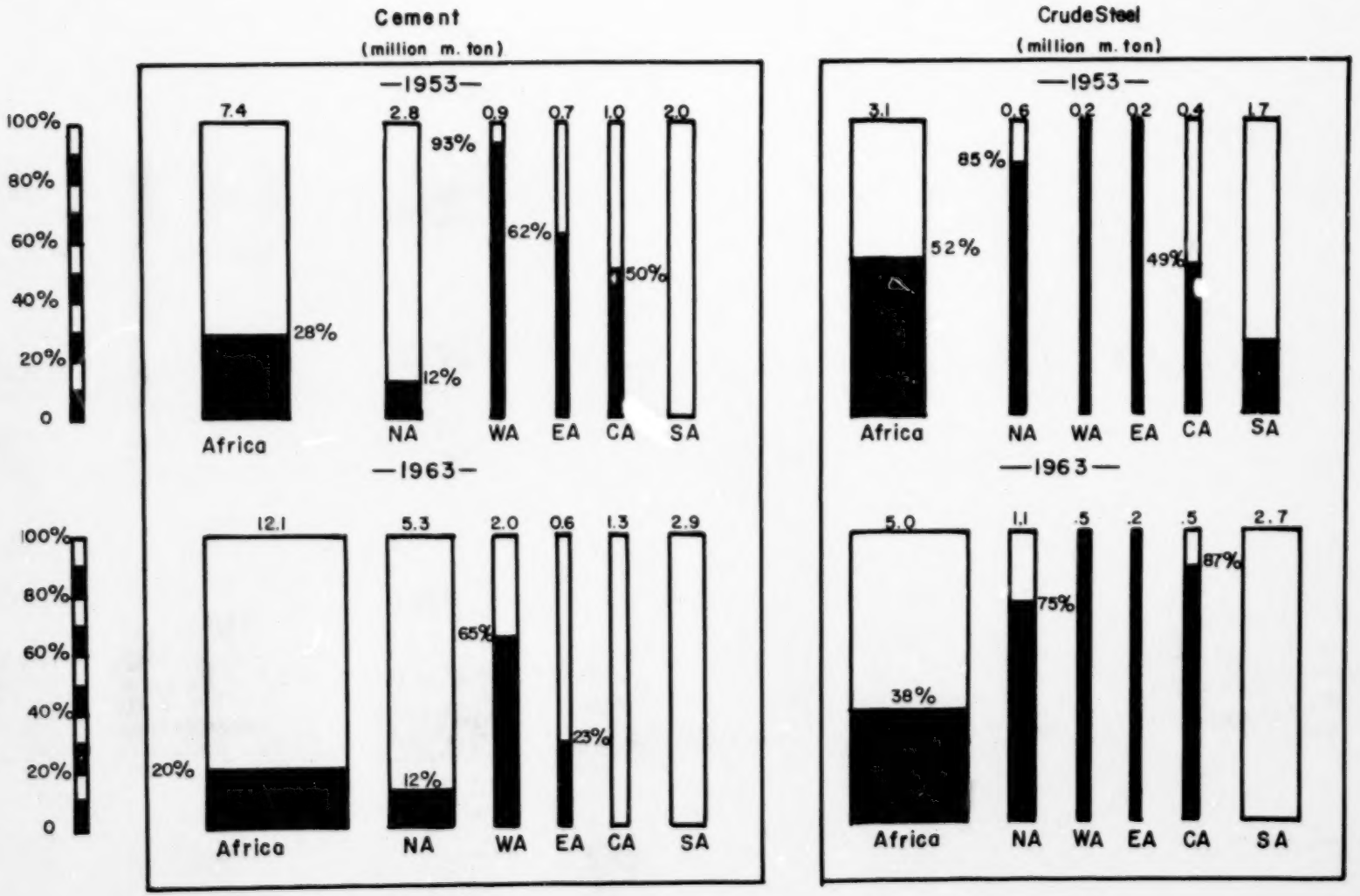


Symbol

- Import Share of apparent Consumption
- Domestic production Share of apparent Consumption

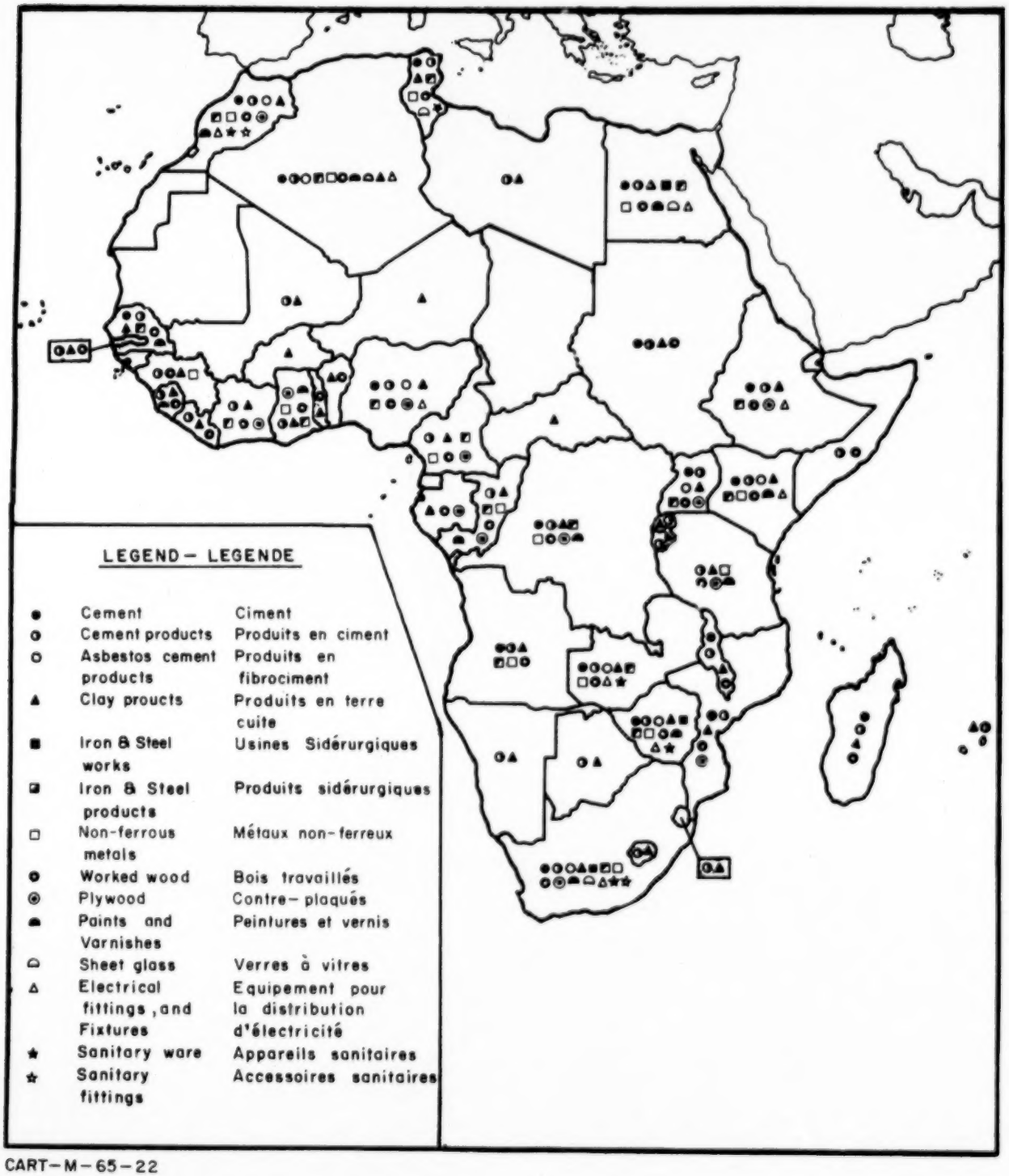
NA= North Africa
WA= West Africa
EA= East Africa
CA= Central Africa
SA= Southern Africa

Graph 7. (Cont'd)



MAP-CARTE I

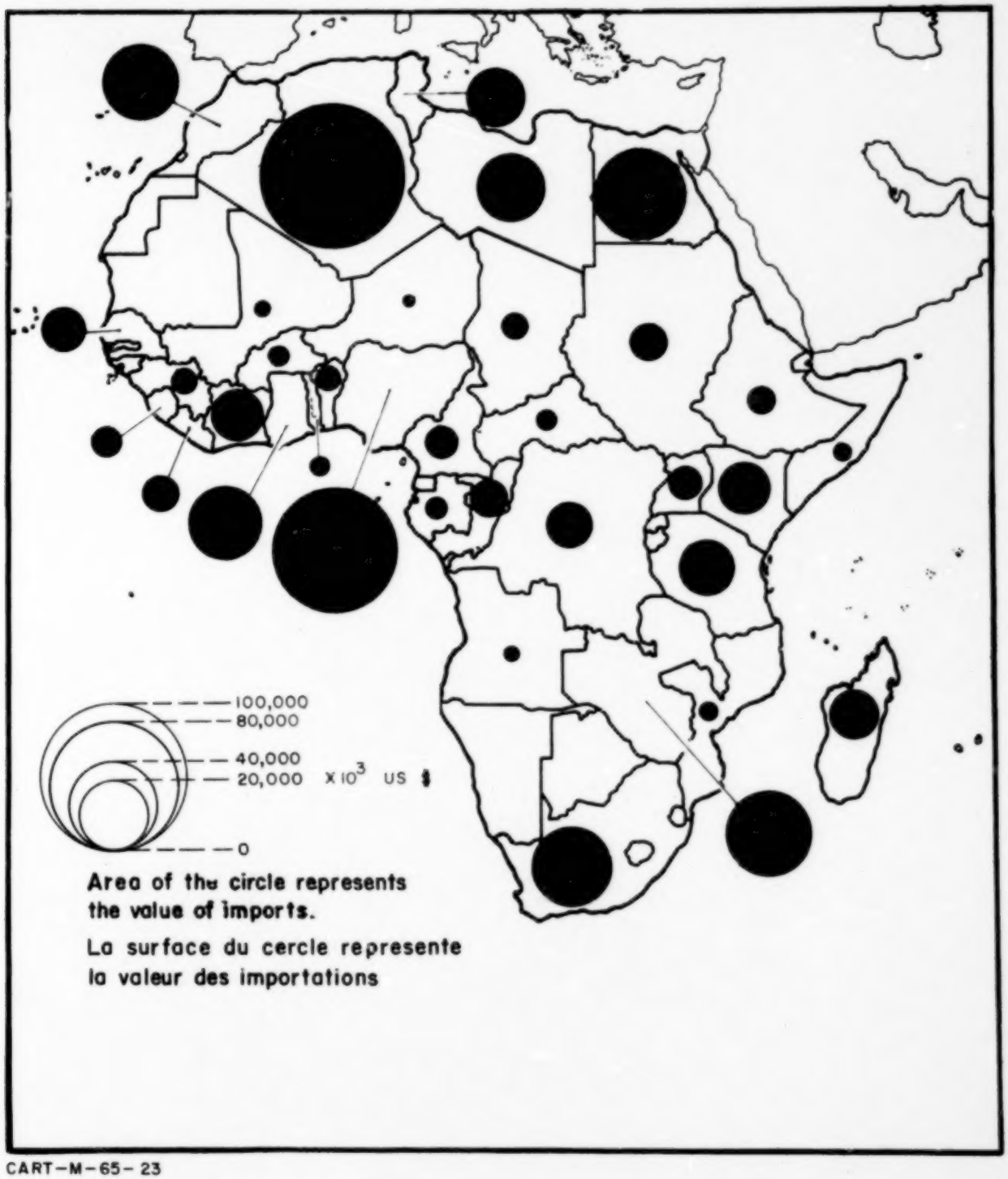
DOMESTIC PRODUCTION OF BUILDING MATERIALS - 1960
PRODUCTION DE MATERIAUX DE CONSTRUCTION - 1960


LEGEND - LEGENDE
Cement — Ciment
Cement products — Produits en ciment
Asbestos cement products — Produits en fibrociment
Clay proucts — Produits en terre cuite
Iron & Steel works — Usines Sidérurgiques
Iron & Steel products — Produits sidérurgiques
Non-ferrous metals — Métaux non-ferreux
Worked wood — Bois travaillés
Plywood — Contre-plaqués
Paints and Varnishes — Peintures et vernis
Sheet glass — Verres à vitres
Electrical fittings, and Fixtures — Equipement pour la distribution d'électricité
Sanitary ware — Appareils sanitaires
Sanitary fittings — Accessoires sanitaires

CART-M-65-22

MAP-CARTE 2

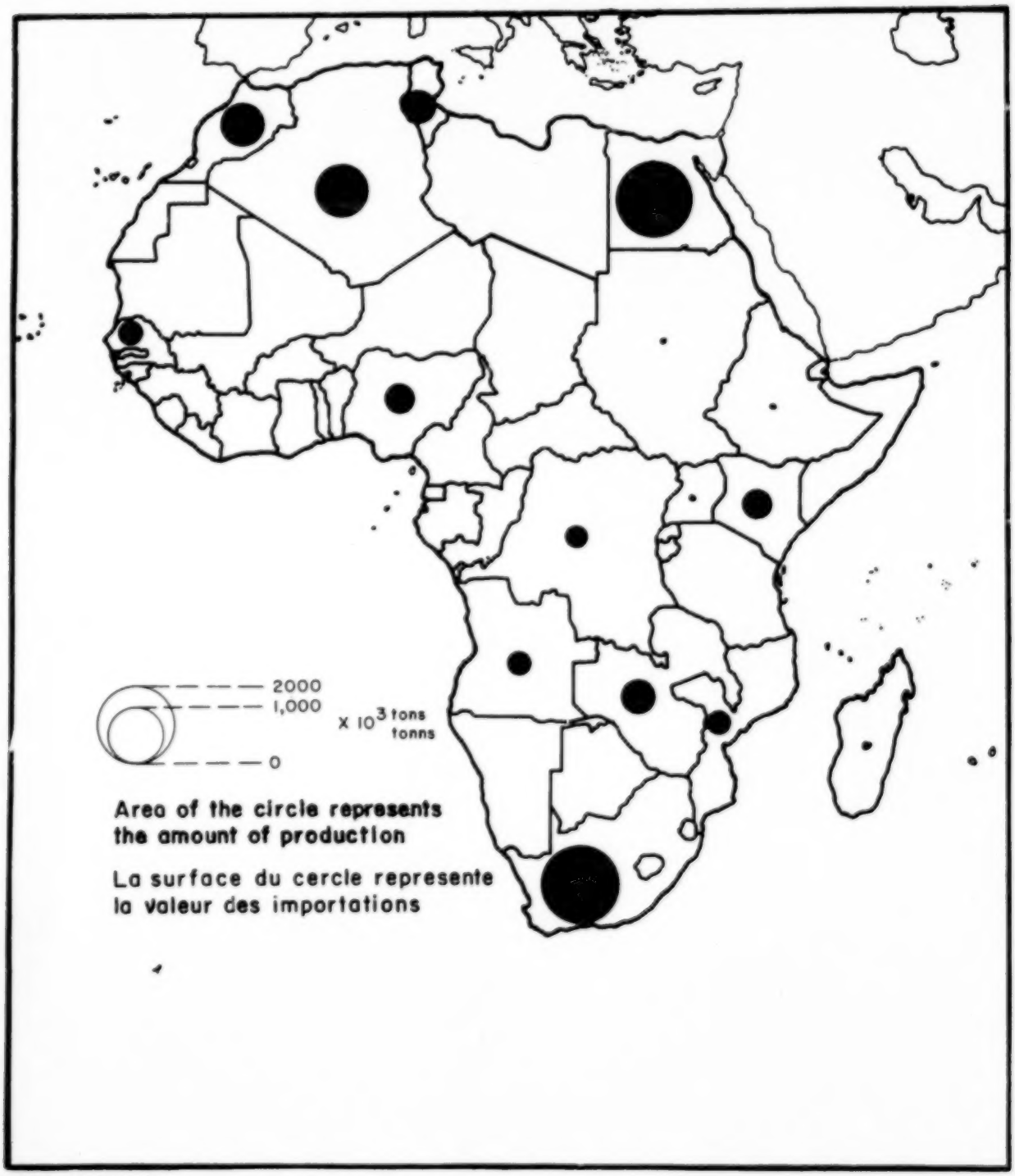
VALUE OF IMPORTS OF CONSTRUCTION MATERIALS 1960
VALEUR DES IMPORTATIONS DE MATERIAUX DE CONSTRUCTION 1960



CART-M-65-23

MAP-CARTE 3

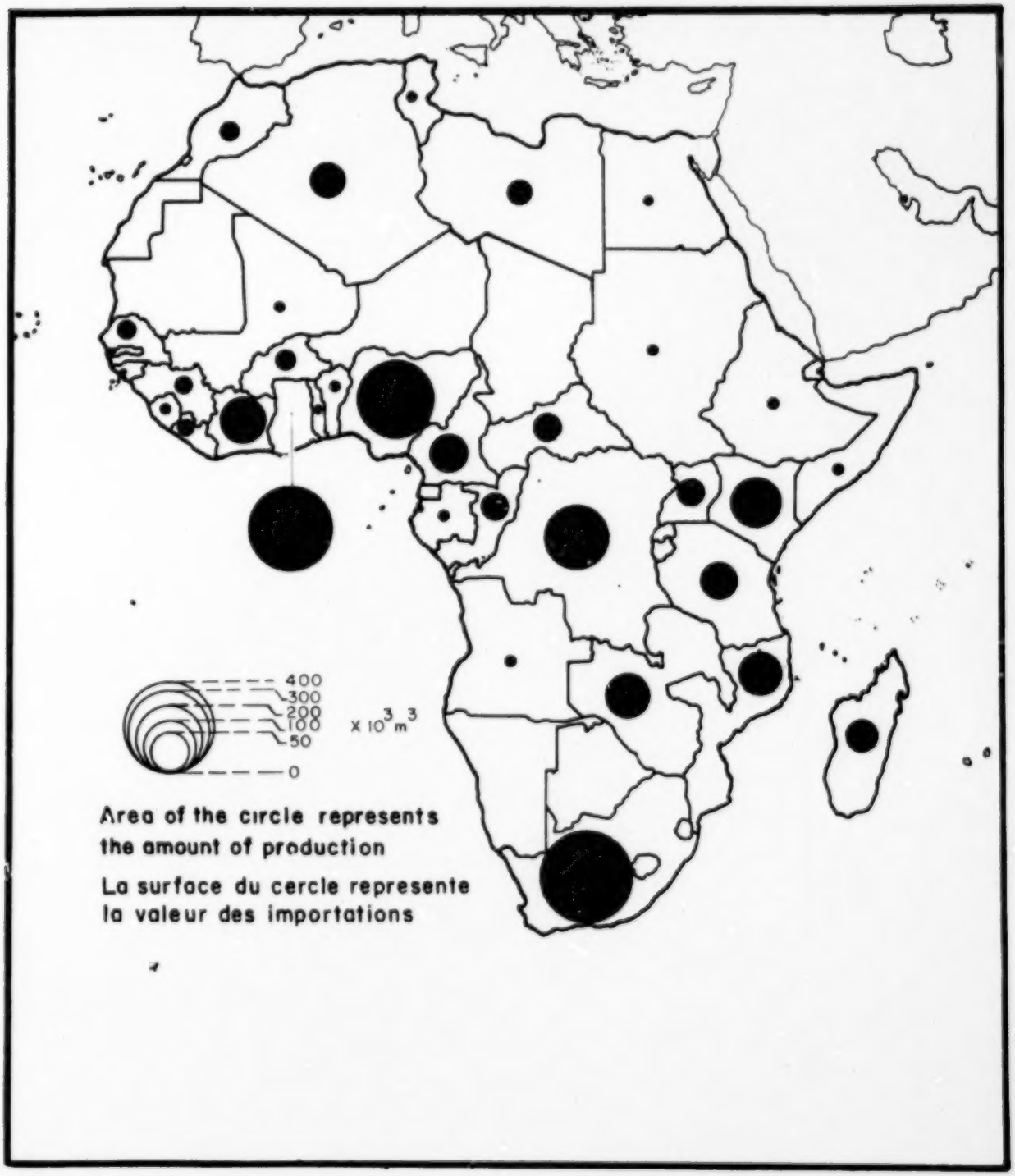
PRODUCTION OF CEMENT 1960
PRODUCTION DE CIMENT EN 1960



CART-M-65-24

MAP-CARTE 4

PRODUCTION OF SAWNWOOD 1960
PRODUCTION DE SCIAGES EN 1960

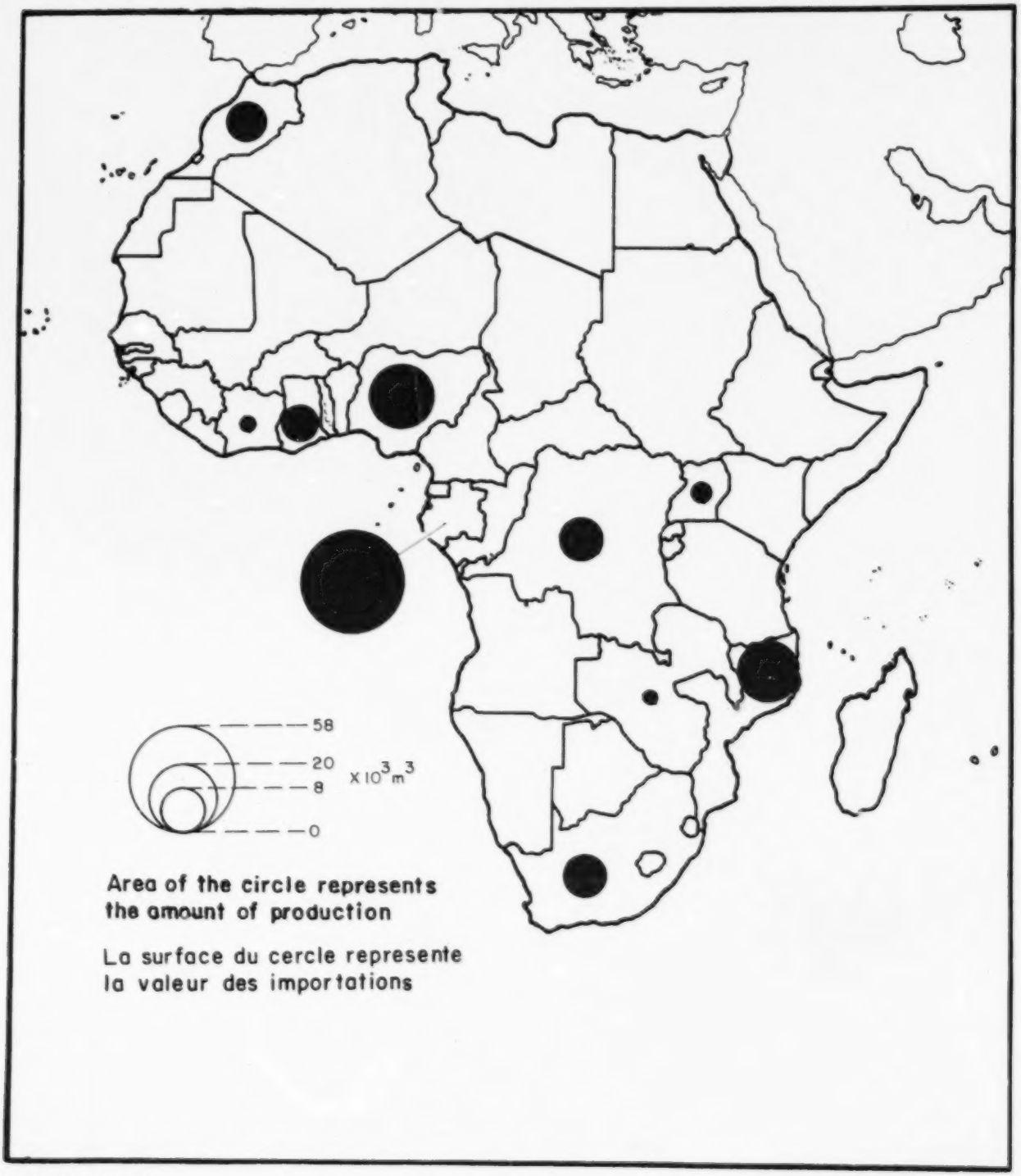


CART-M-65-25

MAP-CARTE 5

PRODUCTION OF VENEERS & PLYWOOD 1960

PRODUCTION DE CONTREPLAQUES ET BOIS DE PLACAGE 1960



CART-M-65-26

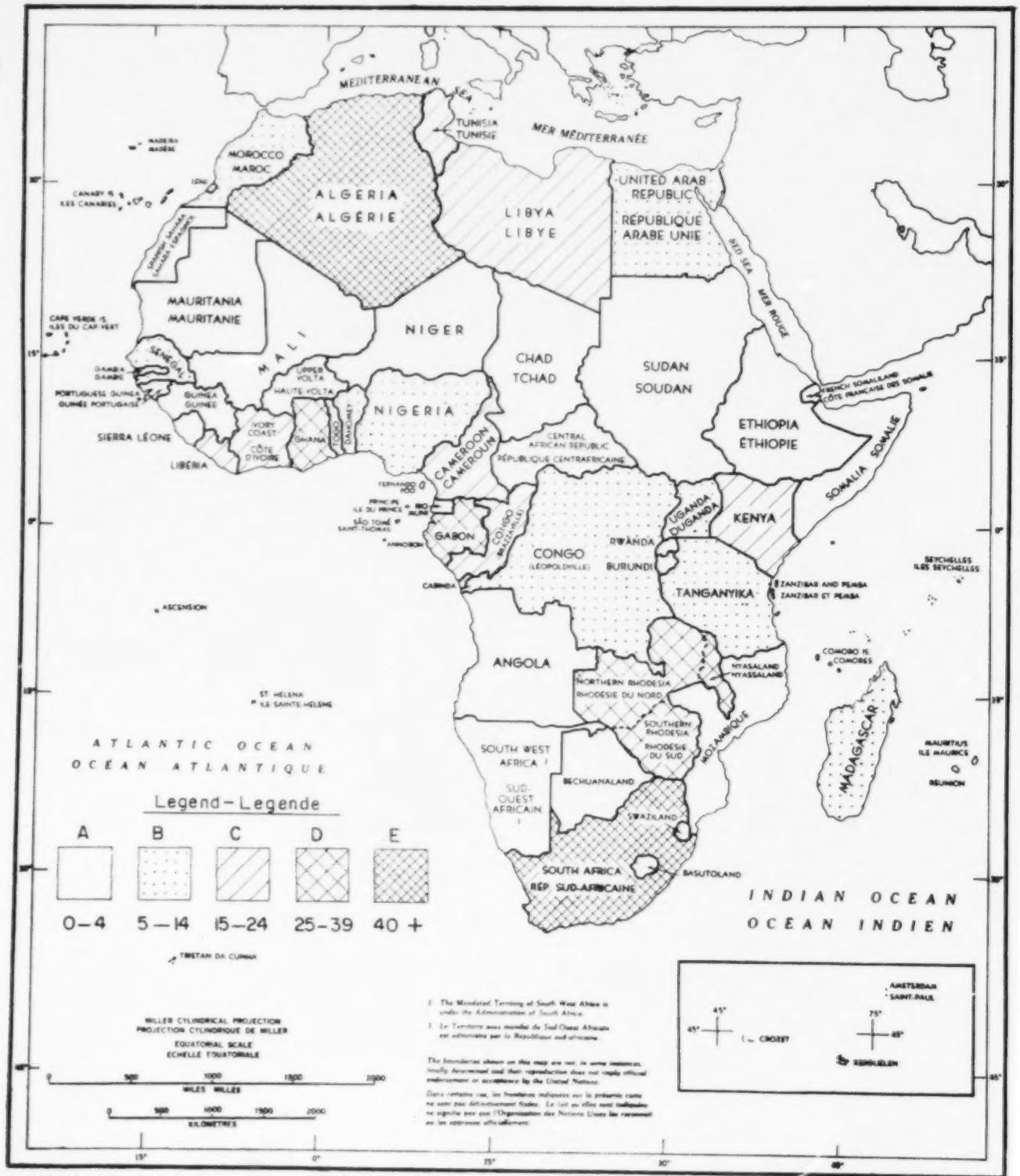
MAP-CARTE 6

PER CAPITA CONSUMPTION OF CEMENT IN KG.—1960
CONSOMMATION DE CIMENT PAR HABITANT, EN KG.—1960

CART-M-65-27

MAP-CARTE 7

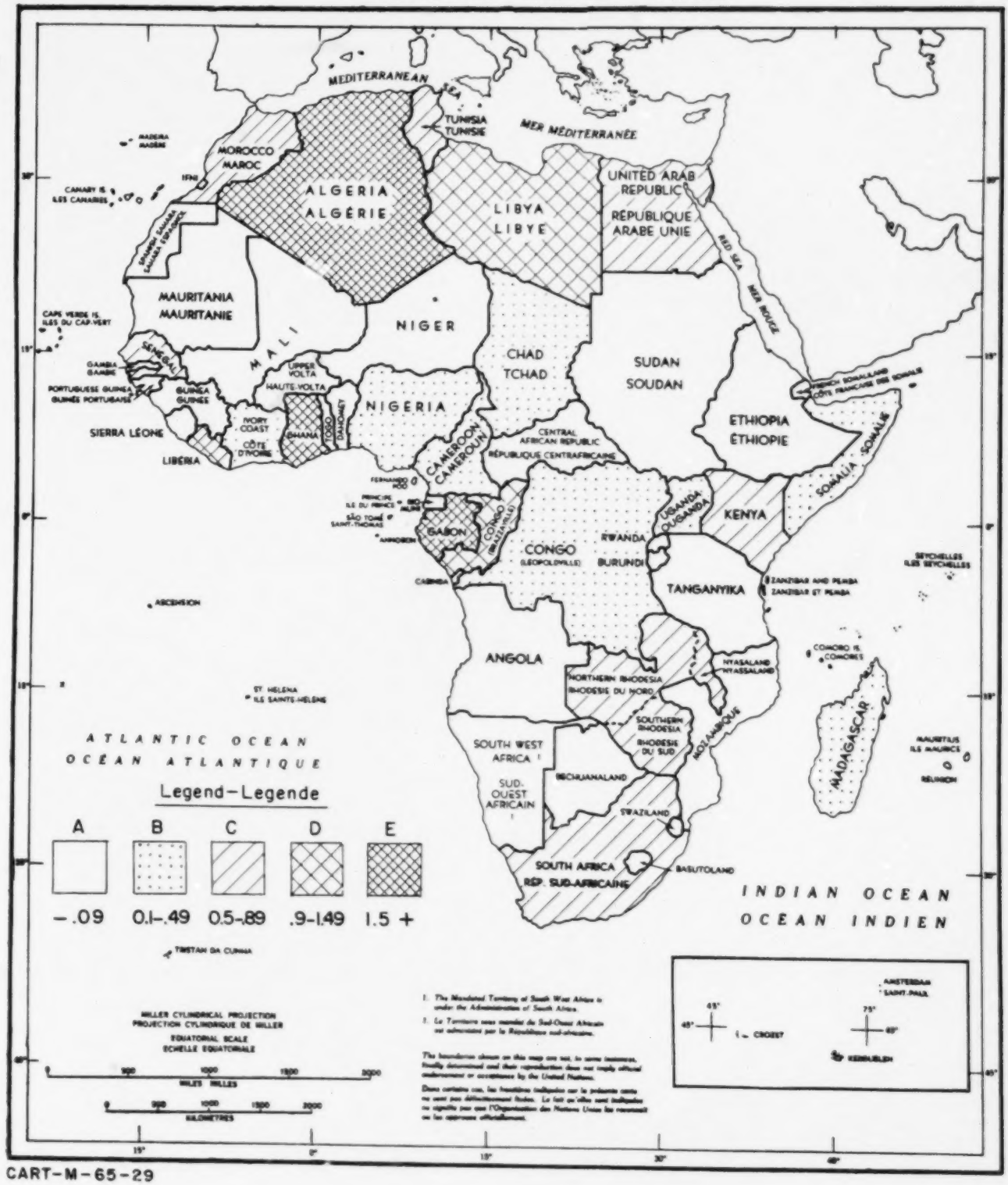
CONSUMPTION OF SAWNWOOD PER 1000 INHABITANTS IN M^3 – 19
CONSOMMATION DE SCIAGES POUR 1000 HABITANTS EN M^3 – 1960



CART-M-65-28

MAP-CARTE 8

CONSUMPTION OF VENEERS & PLYWOOD PER 1000 INHABITANTS IN M^3-196
CONSOMMATION DE CONTRE-PLAQUES ET DE PLACAGES POUR 1000 HABITANTS EN M^3-1960



1. The Mandated Territory of South West Africa is under the Administration of South Africa.

1. Le Territoire sous mandat du Sud-Ouest Africain est administré par la République sud-africaine.

The boundaries shown on this map are not, in some instances, finally determined and their representation does not imply official endorsement or acceptance by the United Nations.

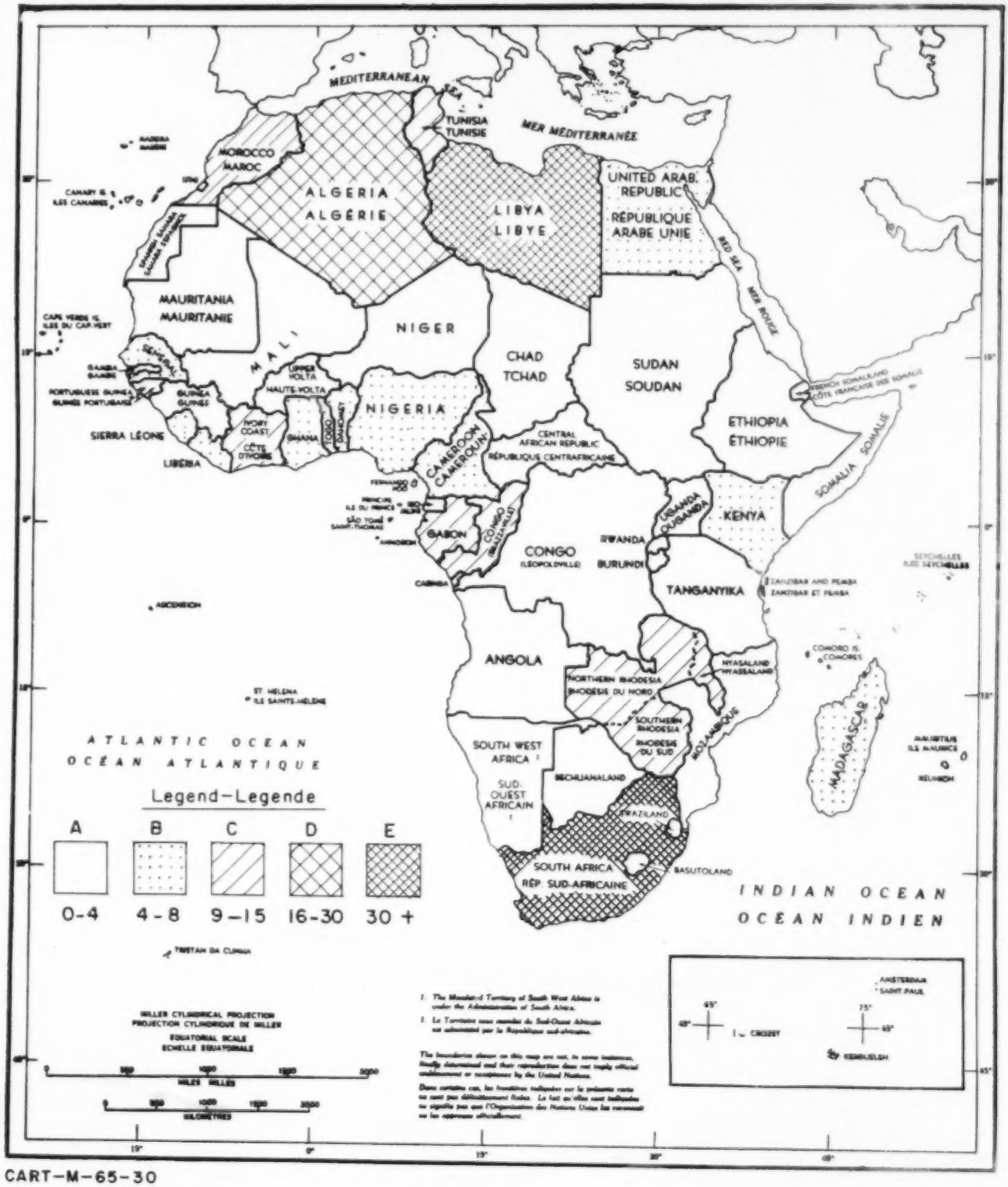
Dans certains cas, les frontières indiquées sur la présente carte ne sont pas définitivement fixées. Le fait en effet qu'elles sont indiquées ne signifie pas que l'Organisation des Nations Unies les reconnaît ou les approuve officiellement.

CART-M-65-29

MAP-CARTE 9

PER CAPITA CONSUMPTION OF IRON & STEEL PRODUCTS IN KG.-1960

CONSOMMATION DE PRODUITS SIDERURGIQUES PAR HABITANT EN KG.-1960



CART-M-65-30